

NON-PUBLIC?: N
ACCESSION #: 8807260041
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Vermont Yankee Nuclear Power Station PAGE: 1 of 4

DOCKET NUMBER: 05000271

TITLE: Main Turbine Trip And Reactor Scram From Feedwater Flow Controller
Malfunction Due To Failed Feedwater Flow Integrator
EVENT DATE: 06/18/88 LER #: 88-007-00 REPORT DATE: 07/18/88

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: James P. Pelletier, Plant Manager TELEPHONE #: 802-257-7711

COMPONENT FAILURE DESCRIPTION:
CAUSE: X SYSTEM: JB COMPONENT: CTR MANUFACTURER: G080
REPORTABLE TO NPRDS: Y

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: On 6-18-88 with the Reactor at 100% power in three element control a Reactor SCRAM occurred due to a turbine trip on High Reactor Water Level at 1737 hours. The High Reactor Water Level was caused by a failed component in the feedwater flow integrator (EIIIS=CTR). The Feedwater Control System (JB) responded to the failure by increasing feedwater flow to maximum thus resulting in the high water level.

The reactor water level reached the high setpoint level in approximately 20 seconds and tripped the turbine before operators could reduce feedwater flow. Following the scram operators secured the C Feedwater Pump and returned Reactor level to normal.

An investigation determined that the cause of the failure was a failed bearing in the integrator counter drive motor. The failed bearing created a short circuit between the armature and motor windings. This short circuit resulted in a false zero flow indication to the flow controller resulting in maximum flow.

The failed feedwater integrator was replaced with a spare. VY personnel

are investigating the possible removal of the integrator from the feedwater control system with General Electric Company. The root cause of the failure was determined to be end of life.

(End of Abstract)

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DESCRIPTION OF EVENT

On 6-18-88, the Reactor was at 100% power, normal steady state operation. The Feedwater Control System was in three element control (inputs from steam flow, feed flow, and water level) with water level at 162 inches at 1008 psig.

At 1737 hours a Reactor SCRAM occurred due to a turbine trip on High Reactor Vessel Level. The High Reactor Water Level was a result of a failed component in the total Feedwater Flow Integrator (EIIS=CTR) in the Feedwater Control System (JB). This failure resulted in an indication of zero feedwater flow signal to the Feedwater Control system. The controller responded to the zero flow signal by increasing feedwater flow to maximum resulting in the Reactor High Water Level.

Upon observing the water level rise, operators entered the Reactor High Level Transient Procedure. Per this procedure, the Feedwater Master level controller was placed from automatic to manual control and the Feedwater Regulating Valves were closed to reduce feedwater flow. However, the water level at maximum flow rate reached the high water level trip in approximately 20 seconds and the operators were unable to avoid the turbine trip on High Water Level.

After receiving the automatic SCRAM, operators entered the SCRAM Procedure. The SCRAM was visually verified (all rods inserted) and Reactor Power was verified to be less than 2%. The operators transferred the Reactor Mode Switch to Refuel Mode at 1739 hours.

A secondary effect from the turbine trip was a corresponding water level decrease which initiated PCIS Groups 2, 3, and 5 isolation due to the resulting low Reactor Water Level at 1738 hours. (Note: These PCIS Groups isolate various Primary Containment penetrations and the Reactor Water Cleanup System).

When Reactor level returned to the normal range, C Feedwater pump was secured at 1739 hours.

Reactor Water Level was stabilized at 170 inches at 1741 hours.

At 1743 hours, turbine vibration trip signals were received on Numbers 5 and 6, this vibration is not uncommon in a coastdown of this nature.

All monitored scram times were satisfactory, however, Control Rod 14-11 was noted beyond the "00" position. This rod was subsequently exercised, and returned to the "00" position.

All safety and relief valves remained closed during the scram as they were not required to open.

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CAUSE OF EVENT

Immediate

The initial cause of the event was at first thought to be a failed capacitor in the feedwater flow integrator. However, further troubleshooting of the circuitry discovered that a motor bearing had failed on the integrator counter drive motor. The failed bearing caused the armature to drop resulting in contact with the motor windings creating a short circuit. The short circuit caused the total feedwater flow signal (in the 3 element control loop) to drop to zero. The flow controller interpreted this as a loss of feedwater and increased flow to maximum resulting in the Reactor High Water Level and subsequent scram. The failed feedwater flow integrator is a General Electric GMAC-561, Model Number 561300AAAC1PHK.

Root Cause

The Feedwater Controller Unit has been in service since 1981. The failed bearing is a sealed unit and cannot be oiled, serviced or partially replaced. Therefore, no preventative maintenance could have been performed to avoid the failure. As a result of the above, the failure mechanism has been determined as end of life.

ANALYSIS OF EVENT

At all times during the event, the Feedwater system (a Non-nuclear safety system) was capable of producing 100% of its designed flow. In addition, during the events discussed:

- a) The Reactor Protection System (RPS) responded as designed.
- b) The PCIS responded as designed.
- c) Operators responded as required by procedure.
- d) Technical Specifications were satisfied at all times during the event.

e) Emergency Core Cooling Systems (ECCS) were operable during the event to provide Reactor Vessel inventory control, although they were not initiated.

Therefore, during the events of this report, there were no adverse safety implications to plant equipment, personnel, or to the public.

CORRECTIVE ACTION

Immediate Corrective Action

When the cause of the failure was isolated to the integrator, the unit was replaced with a new spare.

Further troubleshooting determined the cause of the failure to be due to a short in the integrator drive motor windings caused by failure of the drive motor bearings. The cause of the bearing failure has been determined to be end of life.

A Nuclear Network Entry has been made on 6-22-88 requesting information on similar events at other subscribers plants.

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Long Term Corrective Actions

Further investigations have revealed that the Feedwater Flow integrators are no longer being used at other plants per discussions with General Electric Co. We are currently evaluating the potential for removal of this integrator in the feed flow circuitry here at Vermont Yankee.

ADDITIONAL INFORMATION

No similar occurrences have been reported to the Commission in the last five years.

ATTACHMENT # 1 TO ANO # 8807260041 PAGE: 1 of 1

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July 15, 1988
VYV 88-151

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

REFERENCE: Operating License DPR-28
Docket No. 50-271
Reportable Occurrence No. LER 88-07

Dear Sirs:

As defined by 10CFR50.73, we are reporting the attached Reportable Occurrence as LER 88-07, Rev. 0.

Very truly yours,
VERMONT YANKEE NUCLEAR POWER CORPORATION
/s/ James P. Pelletier
James P. Pelletier
Plant Manager

cc: Regional Administrator
USNRC Office of Inspection and Enforcement
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